103 Alone

1

2 BW

4 # of Hops

5 Hops to ref hops

7 if Don't Allocate, report return sub

8 MPLS decide if to Allocate by compare

9

10 → Take into Acct Preempt. Priority level when decide if to Allocate

13 set BW

16

17 compute metric

20

21

24

26

27

28

32

35

36

39

40

53

29

45

46

47

48

56

57

MAX

103 with Rogin

6 Allocate if cost below & enough resource

3 cost to Preset MAX cost

14

15

22

23

25

33

34

~~38~~

41

42

43

44

54

55

Carry over

103 with ~~Ho~~ Rogin

11 Take from portion at Diff priority level

12 Preempt priority level is lower

18

19

30

31

37 See 18

38 See 12

49 See 18

50 See 12

51 fig 10 of HSU

52

58

59

US-PAT-NO: 6034946

DOCUMENT-IDENTIFIER: US 6034946 A

TITLE: Selection of routing paths in data communications networks to satisfy multiple requirements

---------- KWIC ---------

Detailed Description Text - DETX (16):
The identification of routing paths which satisfy Equations (2a) and (2b) according to various embodiments of the present invention is illustrated in FIG. 3. As shown in FIG. 3, upon receipt of a data transmission request (block 10) a network controller 95 determines if the signal to be transmitted is a constant bit rate signal or a variable bit rate signal (block 12). If the signal is a variable bit rate signal, the network controller identifies network routing paths which have an associated "cost" (which serves as a proxy for the total delay and the queuing delay) that is less than or equal to some maximum specified value. This is accomplished by determining the cost associated with each link in a potential network routing path (block 20 and block 22) and, using these cost values, determining the total cost associated with the routing path (block 24). This total cost is then compared to the maximum allowable cost permitted for the signal which is to be transmitted (block 26). This process is repeated until the total cost has been computed and compared to the maximum allowable cost for some or all of the paths over which the data could be transmitted across the network (block 28) or until a path satisfying the

criteria is located (block 26). In this first embodiment of the present
invention, the cost associated with each link (block 20) is determined a
C.sub.1 q.sub.i +C.sub.2 p.sub.i where q.sub.i and p.sub.i are the queuing and
propagation delays of the i.sup.th link. These link values are summed (block
24) to determine the total cost for a path and that total cost is compared to
C.sub.1 C.sub.2.

Detailed Description Text - DETX (17):
If the signal to be transmitted is a constant bit rate signal, then, the
network controller determines if propagation time data is available (block 14).
If propagation time data is not available, the cost associated with each link
in a potential network routing path (block 30 and block 32) is again determined
and, using these cost values, the total cost associated with the routing path
(block 34) is determined. This total cost is then compared to the maximum
allowable cost permitted for the signal which is to be transmitted (block 36).
This process is repeated until the total cost has been computed and compared to
the maximum allowable cost for some or all of the paths over which the data
could be transmitted across the network (block 38) or until a path satisfying
the criteria is located (block 36). In this second embodiment of the present
invention, the cost associated with each link (block 30) is determined by
2C.sub.1 q.sub.i +(C.sub.1 +C.sub.2)p.sub.i where q.sub.i and p.sub.i are the
queuing and propagation delays of the i.sup.th link. These link values are
summed (block 34) to determine the total cost for a path and that total cost is
compared to C.sub.1 (C.sub.1 +C.sub.2)

Detailed Description Text - DETX (18):

If the signal to be transmitted is a constant bit rate signal and propagation time data is available, the cost associated with each link in a potential network routing path (block 40 and block 42) is again determined and, using these cost values, the total cost associated with the routing path (block 44) is determined. This total cost is then compared to the maximum allowable cost permitted for the signal which is to be transmitted (block 46). This process is repeated until the total cost has been computed and compared to the maximum allowable cost for some or all of the paths over which the data could be transmitted across the network (block 48) or until a path satisfying the criteria is located (block 46). In this third embodiment of the present invention, the cost associated with each link (block 40) is determined by (c.sub.1 -p.sub.min)q.sub.i +x.sub.0 p.sub.i where q.sub.i and p.sub.i are the queuing and propagation delays of the i.sup.th link, p.sub.min is the minimum propagation delay and x.sub.0 =(c.sub.1 +c.sub.2) (c.sub.1 -p.sub.min)/2c.sub.1. These link values are summed (block 34) to determine the total cost for a path and that total cost is compared to C.sub.1 x.sub.0.

Detailed Description Text - DETX (31):

As will be understood by those of skill in the art, any conventional "shortest path" routing technique may be modified to utilize the cost evaluation and proxies of the present invention. As such, it should be understood that the present invention is not limited to any particular path selection technique, as any number of conventional techniques may be used to carry out the present invention simply by modifying the "cost" value which is attributed to each transmission link in the network and by calculating a

US-PAT-NO: 6259673

DOCUMENT-IDENTIFIER: US 6259673 B1

TITLE: Route selection method

---------- KWIC ---------

Detailed Description Text - DETX (28):
At step S14, the sum of costs ranging from the maximum cost to a [n (the number of nodes)-1]th largest cost is set as the upper limit value CUB. In the present embodiment, the number of nodes is 10 (A to J). As the sum of costs ranging from the maximum cost of 26 (between A and E) to the ninth cost, therefore, 78 is set as the upper limit value CUB. Because 26 (between A and E)+20 (between C and D)+20 (between F and J)+2 (between A and B)+2 (between A and G)+2 (between B and C)+2 (between C and F)+2 (between E and F)=78.

Current US Original Classification - CCOR (1):
370/238